WIREWORM CONTROL

By R. C. TREHERNE

Chief, Division of Field Crop and Garden Insects

The Wheat Wireworm and Adult
(After Hudson)

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
PAMPHLET No. 33—NEW SERIES

THE ENTOMOLOGICAL BRANCH
ARTHUR GIBSON, Dominion Entomologist

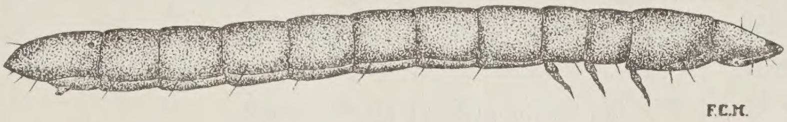
Published by direction of the Hon. W. R. Motherwell, Minister of Agriculture.
Ottawa, April, 1923

WIREWORM CONTROL

By R. C. TREHERNE, Chief, Division of Field Crop and Garden Insects.

Wireworms are slender, brownish worms, about one inch in length when full grown. Their bodies are hard, shell-like, and shiny; and three pairs of short legs may be seen on the segments nearest the head. They live entirely below ground, where they feed on decaying vegetable matter and on the roots of growing plants, their smooth, wiry, cylindrical, bodies allowing them to move freely through the soil. Tubers of potatoes, bulbs of onions, fleshy roots of beets and garden vegetables, germinating seeds of corn, and the fibrous roots of grain and grass crops, are commonly attacked. The losses caused are sometimes very great.

The adults of wireworms are beetles, the species commonly injurious in Canada being about one-half inch in length and brown or black in colour. They are usually spoken of as " click " beetles or " snapping " beetles, from their peculiar habit of flipping themselves into the air, with an audible click, when placed on their backs. As adults they live above ground and are known to feed voraciously at times on plant growth.



A Wireworm, the larval stage of a Click Beetle, enlarged 3 times (Original)

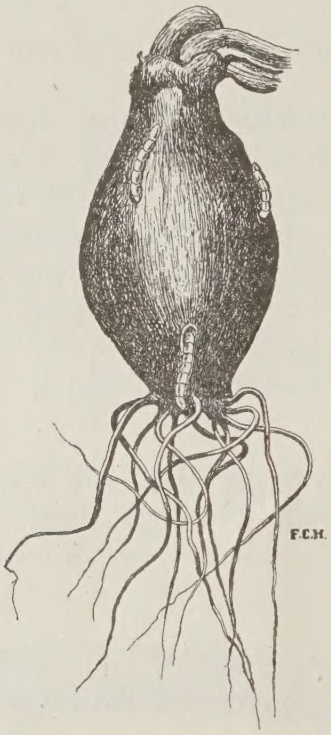
As agricultural pests wireworms rank very high indeed, and from their subterranean form of existence are very difficult to control.

There are many species of wireworms of importance to agriculture; in general their life histories are similar. The eggs, so far as is known, are laid by the female beetles in the soil, preferably in land clothed with an even stand of vegetation. Sod land is commonly chosen, but fields of oats, wheat and other field crops, are often selected.

The worms which hatch from these eggs spend from two to four years in the soil, beneath the surface, feeding on roots and vegetation proportionate to their size. The decaying vegetation produced by the ploughing down of sod land in the spring or autumn will provide ample food for the young wireworms for a year or more. Growth takes place slowly and on becoming full grown the wireworm transforms into a pupa. This is the resting stage of the insect and it occurs in a small earthen cell a few inches below the surface of the ground. Later, and usually in the autumn of the year, the pupa transforms into an adult beetle which emerges from the soil during the following spring.

REMEDIAL MEASURES

Wireworms occur most frequently in " bottom " lands in soil poorly drained, and in pasture lands. Susceptible crops, such as potatoes, corn, onions, etc., planted in sod land, frequently suffer severe injury. On bench lands or in well drained soils the injuries are usually not so severe, and by a proper selection of crops in rotation, much may be done to avoid damage. Seed treatments with deterrent substances have not given much relief. The principles of soil fumigation with gas-forming materials have certain virtues, but, in general, such treatment is not recommended under field conditions owing to the cost and the danger of injury to plant growth. Soil treatments with commercial fertilizers will very often enable plants to outgrow an attack, and on this account may be recommended. Such treatment will not, however, destroy the wireworms. Trapping adults and larvæ by using baits has rendered relief on valuable land, and with crops having a high cost of production, such as market garden crops of onions, tomatoes, etc., but with grain, grass or field crops, cultural methods of control must be relied upon. Crop rotations, deep ploughing and thorough cultivation, together with a judicious selection of crops, will offset injury to a very marked degree.



An Onion Infested by Wireworms
(Original)

CONTROL BY BAITS

It would appear that the success of any treatment involving the use of baits is dependent upon the time of year at which it is practised. So far as our experience in Canada is concerned it is absolutely necessary to apply the baits in the early spring conjointly with the period of seeding, or at a time when the soil is warm enough for seeding. During this period wireworms are readily attracted to baits set in the soil. Potatoes, balls of dough, shorts, meal, or rice-bran, are being used. Mid-summer applications of soil bait have proved useless in experiments conducted in Canada, unless used in bare or fallow land. The explanation seems to lie in the fact that the presence of root growth, whether of the crop under cultivation or of weeds, serves as a counter attractant. The same consideration applies to the application of baits in the

spring; their value being dependent on the amount of vegetation or root growth in the soil. To obtain the most satisfaction from the use of baits, arable land well cultivated in the autumn, clean and free from weed growth, should be treated in the early spring, which in many sections of Canada means the latter part of April.

Ordinary potatoes may be used, cut on one surface and set into the soil a few inches deep at intervals of ten feet apart throughout the fields. A piece of stiff wire piercing the potato and showing above the soil surface will prove useful in indicating the location of the baits. Often the portion of wire above the soil surface may be whitened in order to indicate more clearly its position. Five to seven days later these baits should be removed and either dipped into a bucket of boiling water and reinserted into the soil, or thrown into a wagon to be hauled away, in which case fresh potatoes should be set in their place. The same operation should be again undertaken about a week later, after which no further baits need be set during the year.

Wheat or rice-shorts, rice-bran, corn meal, the pulverized refuse from mills or rice-polishing warehouses, may be used instead of potatoes. Such materials should be roasted dry in pans or on sheets of tin over a fire. As they brown they should be turned frequently by a hoe or some similar instrument and raked off into a pile. With the aid of a little water, the shorts or bran should be moulded by hand into small compact balls. A number of these should then be placed in sacks, taken to the fields and set, individually, ten feet apart, in rows of shallow holes gouged in the soil with a hoe. The baits should then be covered with soil and left, as with the potato baits, for from five to seven days. These baits may be broken open by hand and the wireworms removed, the baits either being reset or replaced by fresh ones. The discarded baits may be used for chicken or pig feed. The addition of molasses or other attractant in these bran-baits does not improve their usefulness, nor has the inclusion of arsenicals been of any practical value. Approximately fifty pounds of bran or shorts are required to treat an acre once, at a cost of about $15.

With a light infestation of wireworms it is not necessary to remove the baits as their usefulness remains sufficiently long enough to enable the plants to become established. The use of baits is specially applicable in market gardens, in onion plantations and on land producing a valuable and highly priced crop.

Control in Grass or Grain Land

In view of the fact that wireworms commonly infest sod land, crops such as potatoes, tomatoes, wheat, etc., often suffer severely on recently broken land. Legume-forage crops, alfalfa, clover, field peas and beans, buckwheat and flax are not subject to attack. These crops, therefore, may be grown with a reasonable degree of safety on wireworm-infested soil for a period of two, three or four years. This allows the wireworms to mature. The length of the rotation period before hoed or grain crops may safely be planted depends upon the number of the wireworms in the soil and their stage of development. Farmers, who recognize the appearance of wireworms, may turn over the soil for examination, or some potato or meal baits may be employed much in the manner previously described.

In the wheat-growing districts of the Prairie Provinces, relief from wireworm attack may be expected by intensive summer-fallowing, commencing in early June. Ploughing between May 15 and July 15 is often effective. Insectivorous birds at this season of the year play an important part in destroying wireworms.

Frequent ploughing and cultivation to prevent volunteer wheat growth or weed development, will destroy many of the worms, very largely by starvation. In arid or semi-arid sections, soil lacking in root growth or fibrous vegetable matter will not support wireworms for any great length of time. If a crop of wheat has been destroyed by wireworms it would not be advisable to reseed to wheat for a year or two, but any of the crops mentioned as being practically immune to injury may be planted. Heavy seeding of wheat is often practised on lightly infested land.

In many sections of British Columbia and the Prairie Provinces, False Wireworms (*Eleodes*) have been known to cause material damage. Many different species of these are known to occur. The adult is a large, clumsy, black beetle, which is capable of running actively over the surface of the soil. Many beetles found on the surface of the soil have this habit in common, but the adults of the False Wireworms may be recognized by the peculiar habit they possess of often standing still, as it were, on their heads, when disturbed by a stick or a piece of straw. The larvæ of the False Wireworms are usually light yellow to chestnut in colour, somewhat larger than the true wireworms, but possessing a hard shell-like body. The pair of legs nearest the head is frequently noticeably larger than the second and third pairs. In British Columbia, potatoes planted on recently broken land have been known to suffer severely. Baits of bran or shorts to which have been added a small quantity of Paris green, or white arsenic, may be set in the soil in furrows, for the control of these insects if considered desirable. Otherwise, ordinary cultural methods, with crop rotation, will suffice to hold them in control.